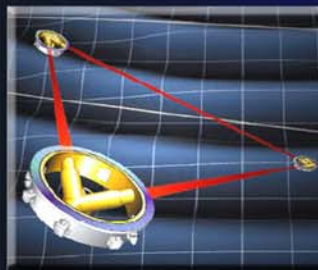


The Laser Interferometer Space Antenna (LISA)



LISA maps Einstein's relativistic Universe

It is the first space-based gravitational wave observatory

NASA leverages substantial European assets, contingent on prompt action

LISA is an approved ESA "Cornerstone Mission", already in Phase A

Our Formulation Phase focuses on technology and mission risk mitigation

The plans, processes and teams are in place

Our Technology Plan achieves TRL 6 by 2006

A robust approach is defined, with parallel paths and development offramps

The Implementation Team is ready for a FY08 start

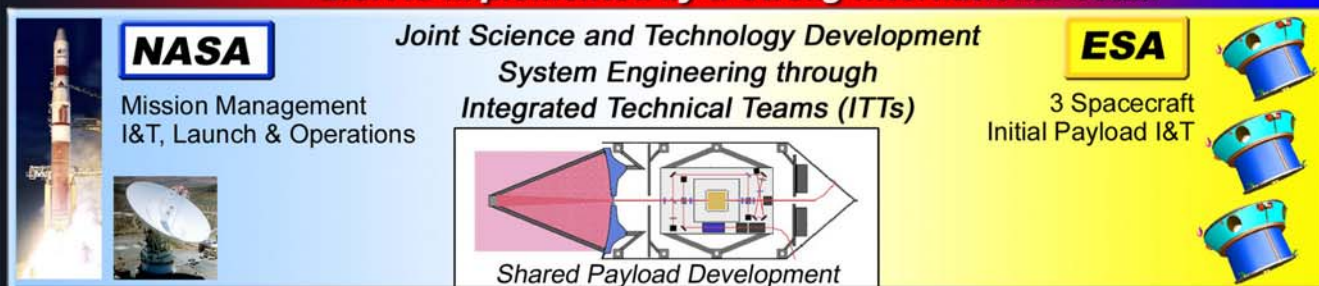
NASA/ESA agree on contributions, roles and responsibilities

LISA implements the NASA Strategic Plan through revolutionary scientific measurements

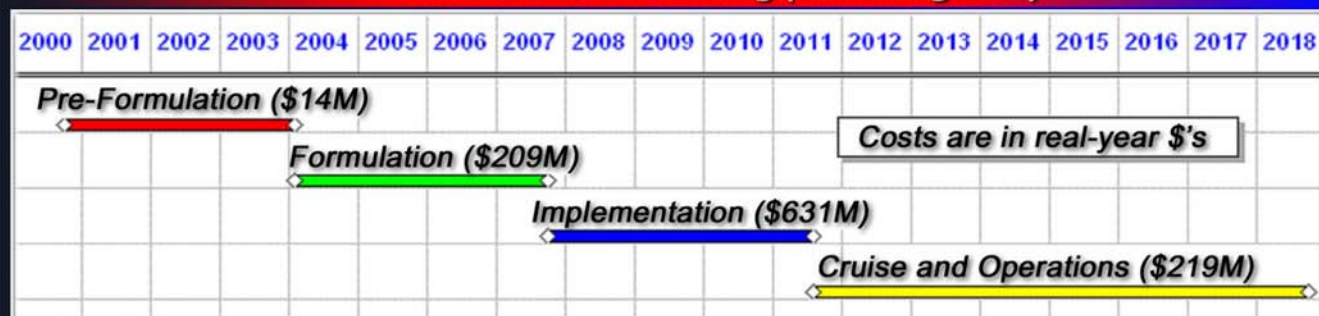
LISA Science Observations	NASA Space Science Enterprise Objectives*		
	Understand structure of the Universe—from its earliest beginnings to ultimate fate.	Explore the ultimate limits of gravity and energy in the Universe.	Learn how galaxies, stars, and planets form, interact, and evolve.
Merging supermassive black holes	✓	✓	✓
Intermediate-mass/seed black holes	✓	✓	✓
Gravitational captures from nuclear star clusters		✓	✓
Galactic binaries and verification binaries			✓
Cosmological backgrounds and bursts	✓	✓	

* NASA Strategic Plan 2000 (NPD 1000.1B, September 27, 2000)

LISA is Implemented by a Strong International Team



Full Cost NASA Funding (excluding ST-7)



Mission Overview

- Delta IV Vehicle launches 3 identical spacecraft
- 13-month cruise - propulsion module is jettisoned after orbit insertion
- Heliocentric Orbits at 1 AU
- 5-year operational life (10-year extended mission)
- Spacecraft deployed into constellation with 3 measurement arms
 - Provides directional and polarization information
 - Robust architecture - minimum science mission achieved with loss of one arm

LISA Spacecraft and Payload Characteristics

Spacecraft

2.7 meter circular structure to fit Y-tube

402kg, 432watts (with payload)

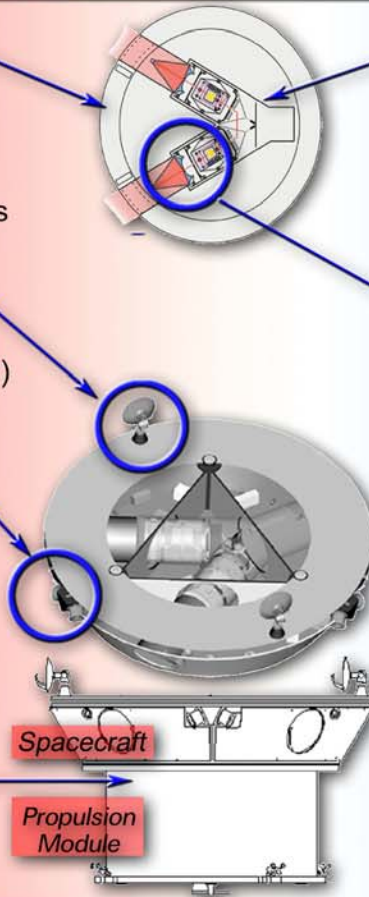
Avionics are standard space-proven components

Telemetry: 30cm X-band antenna, 7kbits/second

Thrusters: Field-Emission Electric Propulsion (FEEP)



Launch stack with 3 identical spacecraft

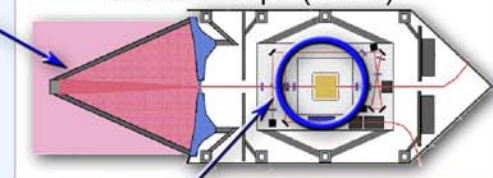


Payload

Y-tube provides thermal shielding and structural support

Support Electronics (not shown) mounted to Spacecraft top and bottom plates

Interferometer optics and telescope (1 of 2)



Proof mass in housing

Interferometer measures strain between proof masses to 10^{-23}

Measurement range: 10^{-4} to 10^{-1} Hz

Angular resolution = 1 arc-minute (strong sources)

Mission Management

- Partnership with ESA - Roles and responsibilities have been defined to capture the strengths of both
- Strong central system engineering effort at NASA-GSFC, supported by integration contractor
- International teams coordinate science requirements and engineering efforts
- Technology program based on mature design concepts and risk assessment
 - Required performance and margins
 - Technology maturity for space flight
 - Testbeds to support Integration and Test

System engineering team moderates the process